

An Unexpected Case of Lyme Disease in a Soldier Serving in Northern Iraq

CPT Jeremy B. Fisher, SP USA*; CPT Christopher E. Curtis, MC USA†

ABSTRACT Lyme disease is a tick-transmitted disease caused by the spirochete *Borrelia burgdorferi*. Cases have been reported across the United States, Canada, and Europe.^{1,2} Additional cases have been described in other parts of the world including Japan, Mexico, and Turkey.³⁻⁵ We report an unexpected case of Lyme disease from Iraq.

CASE REPORT

A 28-year-old active duty Army male, on a deployment to northern Iraq, presented to the clinic for a rash on his right anterior forearm. The patient noted that the rash had been present for approximately 3 days. He described the rash as starting with a circular redness no larger than 2 cm. The patient was very concerned due to the rapid expansion of the rash overnight on the fourth day to a large oval lesion. He stated that the rash had also become pruritic in nature. He denied any history of chronic skin disease. The patient could not recall any trauma to the area, insect bites, or other exposures that could have caused his rash. He reported no recent travel through undeveloped areas or recent periods of sleeping outdoors. The patient stated that he had been in Iraq for 8 consecutive months and had worked as a mechanic in a garage during that period. He denied using any medications or exercise supplements. A comprehensive review of systems was noncontributory.

Physical exam was remarkable for a 10 by 15 cm oval, erythematous, macular rash with well-defined borders present on the patient's right anterior forearm. Central clearing of the rash was noted (Fig. 1). There was no evidence of a bite mark, induration, vesicles, calor, or necrosis. A thorough skin exam revealed no other lesions present. The patient was afebrile with stable vital signs. The remainder of the physical exam was unremarkable. A diagnosis of early localized Lyme disease was made on the basis of a presentation of erythema migrans with no secondary symptoms.

The patient was started on oral antibiotic therapy with doxycycline 100 mg twice daily for 21 days. The patient tolerated the medication well and resolution of the erythema migrans was noted within 7 days.

DISCUSSION

Lyme disease (LD), caused by infection with the spirochete *Borrelia burgdorferi* (*B. burgdorferi*) and the immune system's response to this infection, is increasing in prevalence in the United States with the Centers for Disease Control (CDC) reporting a 40% increase from 2001 to 2002. Epidemiologic reports from the CDC have indicated an incidence of 6–8.2 per 100,000.⁶ The bacteria that cause Lyme disease live naturally in small rodents typically mice and squirrels although cases have been reported implicating several species of birds and lizards.^{3,7,8}

In the United States, Lyme disease is transmitted by the *Ixodes* tick with both the *Ixodes scapularis* and *Ixodes pacificus* as the primary vectors transmitting the disease.¹ In Europe and other parts of the world, *Ixodes ricinus*, *Dermacentor marginatus*, and *Ixodes persulcatus* have been shown to act as reservoirs for the bacteria.^{2,3,9} Multiple species of the *Ixodes* family have been identified in southern Turkey and northern Syria, both of which share borders with northern Iraq.¹⁰

Small numbers of bacteria are present in the midgut of infected ticks. Upon feeding, the blood meal stimulates bacterial multiplication in the gut of the tick. Bacteria then migrate to the salivary glands of the tick and the bacteria are introduced into the skin through the bite of an infected tick. This process requires tick attachment for a minimum of 16 to 24 hours to transmit the infection.¹¹

The diagnosis of LD must incorporate a thorough history to determine the probability of exposure to a tick bite concentrating on occupational and recreational activities. Patients commonly present with complaints of malaise, fatigue, irritability, or cognitive deficits. Physical examination may reveal a lesion with the classic “bull’s eye” appearance (erythema migrans), pain elicited with movement of joints, or focal neurologic deficits. According to the CDC, “for surveillance purposes, a case of LD is defined as physician-diagnosed erythema migrans (EM) >5 cm in diameter or at least one objective manifestation of late LD (e.g., musculoskeletal, cardiovascular, or neurologic) with laboratory confirmation of *B. burgdorferi* infection using a two-tiered assay.”⁶

The spectrum of LD is broad, ranging from a simple erythema migrans or arthritis to meningitis, encephalitis, and heart block. There are several factors that determine the severity

*Tropic Lightning TMC, Bldg. 677, Schofield Barracks, HI 96857.

†99-1215 Aiea Heights Drive, Aiea, HI 96701.

Authors did not receive any financial support or provision of supplies in this endeavor.

None of the contributing authors have any commercial or proprietary interest in any drug, device, or equipment mentioned in the submitted article. None of the contributing authors have any financial interest in any item mentioned in the article.

Report Documentation Page			Form Approved OMB No. 0704-0188		
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE MAY 2010		2. REPORT TYPE		3. DATES COVERED 00-00-2010 to 00-00-2010	
4. TITLE AND SUBTITLE An Unexpected Case of Lyme Disease in a Soldier Serving in Northern Iraq				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Tropic Lightning TMC,Bldg 677,Schofield Barracks,HI,96857				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT Lyme disease is a tick-transmitted disease caused by the spirochete Borrelia burgdorferi. Cases have been reported across the United States, Canada, and Europe. 1,2 Additional cases have been described in other parts of the world including Japan, Mexico, and Turkey.3-S We report an unexpected case of Lyme disease from Iraq.					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 3	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

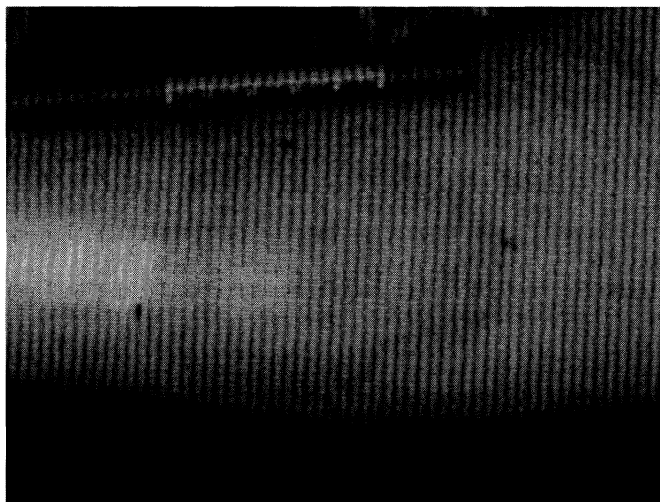


FIGURE 1. Classic erythema migrans rash of LD.

of the disease manifestations including: host genetic factors, immunocompetence of the individual infected, and coinfection with other tick-borne disease (e.g., human granulocytic ehrlichiosis).

LD can be categorized into early and late infection. Early infection has two stages with localized and disseminated disease patterns. Late infection represents the persistent disease that may be seen in LD. The primary symptoms of stage one, early infection are erythema migrans and mild nonspecific symptoms that may include fatigue, malaise, and irritability. In stage two, LD evolves into a more disseminated disease affecting various organ systems. Lyme carditis may develop with atrioventricular nodal block sometimes in association with clinical evidence of myopericarditis. Neurologic manifestations include Lyme meningitis, radiculopathy, and cranial nerve palsies. Previously mild, nonspecific complaints may become severe malaise and fatigue that might include intermittent arthritis. Late infection represents the persistent effects of LD. Patients may have prolonged arthritis, chronic neurologic manifestations of encephalitis and parapareses, and generalized symptoms consistent with fibromyalgia.¹

CDC recommendations are for a two-step process for serologic confirmation of *B. burgdorferi*. The first step is to order either a total Lyme titer or immunoglobulin G (IgG) and immunoglobulin M (IgM) titers in patients with symptoms consistent with Lyme disease. If positive titers are returned, the second step is confirmation or results with a Western blot. It should be noted that antibody testing in patients with erythema migrans is not routinely indicated because the rash may develop before the antibodies.¹²

Doxycycline is the treatment of choice for early localized disease as it is 95% effective against *B. burgdorferi* as well as effective against human granulocytic anaplasmosis coinfection. However, it is relatively contraindicated in children under 8 years old or during pregnancy and may cause photosensitivity. Duration of therapy varies depending on symptoms

with an acceptable treatment range of 10–21 days. Second line treatments include amoxicillin 500 mg three times daily for 14–21 days or cefuroxime 500 mg twice daily for 14–21 days. In the patient in which all the above is contraindicated, macrolide therapy can be initiated. Treatments include azithromycin 500 mg daily for 7–10 days, clarithromycin 500 mg twice daily for 14–21 days, or erythromycin 500 mg four times daily for 14–21 days.¹

Oral antibiotic therapy with the previously mentioned antibiotics is also recommended for the treatment of early disseminated disease. A more serious presentation that includes musculoskeletal, neurologic, or cardiac complications may be treated with parenteral therapy. Intravenous therapy is accomplished preferably with ceftriaxone 2 g IV daily for 2 to 4 weeks. Alternatives include cefotaxime 2 g IV every 8 hours or penicillin G 18–24 million units per day divided every 4 hours both for 2 to 4 weeks as well.¹

CONCLUSION

LD is not known to be endemic to Iraq as there is a paucity of information in the literature concerning LD and other vector-borne illnesses in Iraq. This is well explained by a medical threat assessment published in 1991 by the Armed Forces Medical Intelligence Center. In their assessment entitled “Iraq: Assessment of Current Health Threats and Capabilities,” it is noted that “The MOH (Ministry of Health) appears to be regaining administrative control of the nation’s health care system, but restoration of nationwide public health programs apparently is not being addressed. Resumption of public health programs (such as disease surveillance, vector control, and immunization programs...depends completely on the Iraqi government.” It further adds, “Because the regime did not report adequate pre-war disease surveillance data and current disease reporting appears politically biased, the current disease situation in Iraq is difficult to assess. Pre-war disease surveillance data are not available for comparison.”¹³

Our patient did not give history of tick bite or recent travel to a known endemic area, which would suggest an indigenous source of infection. Although as a mechanic, it is conceivable that a tick traveled on the clothing of a patrolling infantry soldier and was in the vehicle being serviced by the patient. Using a clinically diagnosed erythema migrans lesion larger than 5 cm as the basis for our diagnosis, we were able to identify a patient in Iraq with LD. This holds enormous implications for deployed medical providers to Iraq. Disease and nonbattle injuries (DNBI), to include vector-borne illnesses, are a potentially potent threat to the strength of a fighting force. Military medical providers must maintain a high index of suspicion for disease processes that may be present in an area of deployment. Providing deploying medical providers with accurate information through a field surveillance program that analyzes vectors present in an area of operations (AO) and sero-prevalence studies of animals in the AO would provide such information.

REFERENCES

1. Wormser GP, Dattwyler RJ, Shapiro ED, et al: The clinical assessment, treatment, and prevention of Lyme disease, human granulocytic anaplasmosis, and babesiosis: clinical practice guidelines by the Infectious Disease Society of America. *Clin Infect Dis* 2006; 43: 1089.
2. Vassallo M, Pichon B, Cabaret J, Figureau C, Perez-Eid C: Methodology for sampling questing nymphs of *Ixodes ricinus* (Acari: Ixodidae), the principal vector of Lyme disease in Europe. *J Med Entomol* 2000; 37(3): 335–9.
3. Nakao M, Miyamoto K, Fukunaga M: Lyme disease spirochetes in Japan: enzootic transmission cycles in birds, rodents, and *Ixodes persulcatus* ticks. *J Infect Dis* 1994; 170(4): 878–82.
4. Gordillo G, Torres J, Solorzano F, et al: Serologic evidences suggesting the presence of *Borrelia burgdorferi* infection in Mexico. *Arch Med Res* 1999; 30(1): 64–8.
5. Anlar FY, Durlu Y, Aktan G, et al: Clinical characteristics of Lyme disease in 12 cases. *Mikrobiyol Bul* 2003; 37(4): 255–9.
6. Centers for Disease Control and Prevention: Lyme Disease—United States, 2001–2002. *MMWR Morb Mortal Wkly Rep* 1997; 46(RR-10): 20–1.
7. Comstedt P, Bergstrom S, Olsen B, et al: Migratory passerine birds as reservoirs of Lyme borreliosis in Europe. *Emerg Infect Dis* 2006; 12(7): 1087–95.
8. Clark K, Hendricks A, Burge D: Molecular identification and analysis of *Borrelia burgdorferi* sensu lato in lizards in the southeastern United States. *Appl Environ Microbiol* 2005; 71(5): 2616–25.
9. Angelov L, Dimova P, Berbencova W: Clinical and laboratory evidence of the importance of the tick *D. marginatus* as a vector of *B. burgdorferi* in some areas of sporadic Lyme disease in Bulgaria. *Eur J Epidemiol* 1996; 12(5): 499–502.
10. Aydin L, Bakirci S: Geographical distribution of ticks in Turkey. *Parasitol Res* 2007; 101(Suppl 2): S163–6.
11. Piesman J, Mather TN, Sinsky RJ, Spielman A: Duration of tick attachment and *Borrelia burgdorferi* transmission. *J Clin Microbiol* 1987; 25: 557–8.
12. Centers for Disease Control and Prevention: Notice to Readers Recommendations for Test Performance and Interpretation from the Second National Conference on Serologic Diagnosis of Lyme Disease. *MMWR Morb Mortal Wkly Rep* 1995; 44(31): 590–1.
13. Armed Forces Medical Intelligence Center: AFMIC Assessment 05-91, November 15, 1991. Iraq: Assessment of Current Health Threats and Capabilities. Available at http://www.gulflink.osd.mil/declassdocs/dia/19950901/950901_0404pgf_91.html; accessed January 17, 2010.